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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/932,050	08/17/2001	Yoshinori Atsumi	09792909-5142	4510

26263 7590 07/17/2003

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EXAMINER	
DOVE, TRACY MAE	

ART UNIT	PAPER NUMBER
1745	7

DATE MAILED: 07/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/932,050	ATSUMI ET AL.	
	Examiner	Art Unit	
	Tracy Dove	1745	

-- Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --

P riod for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 August 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 August 2001* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

The disclosure is objected to because of the following informalities: on page 5, lines 3-7 the specification states in the formula $A_xM_yPO_4$, M represents a transition metal. The specification further states M preferably includes at least one of Co, Ni, Fe, Mn, Cu, Mg, Zn, Ca, Cd, Sr and Ba. However, the elements Mg, Ca, Sr and Ba are not transition metals. The elements Mg, Ca, Sr and Ba are contained in Group IIA of the Periodic Table and are considered alkaline-earth metals.

Appropriate correction is required.

Claim Objections

Claim 2 is objected to because of the following informalities: in the formula $A_xM_yPO_4$, M represents a transition metal (see independent claim 1). Claim 2 recites M includes at least one of Co, Ni, Fe, Mn, Cu, Mg, Zn, Ca, Cd, Sr and Ba. However, the elements Mg, Ca, Sr and Ba are not transition metals. The elements Mg, Ca, Sr and Ba are contained in Group IIA of the Periodic Table and are considered alkaline-earth metals.

Also note claim 2 contains improper Markush group language. Examiner suggests claim 2 be amended to recite "M includes at least one metal selected from the group consisting of Co, Ni, Fe, Mn, Cu, Mg, Zn, Ca, Cd, Sr and Ba". See MPEP 2173.05(h).

Claim 6 is objected to because of the following informalities: the claim contains improper Markush group language. Examiner suggests claim 6 be amended to recite "...the anode comprises at least one material selected from the group consisting of carbon powder...". See MPEP 2173.05(h).

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 4-6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 contains "and/or" in line 7 and line 8, which renders the claim indefinite. The claim recites "the cathode is a molded body made from an active material, conductive agent and/or binder", which indicates that the cathode may be made from only a binder. However, the cathode of the claimed invention is required to contain $A_xM_yPO_4$ (active material). Therefore, the cathode must be made from at least an active material. The claim further recites "the anode is a molded body made from an active material and/or conductive agent alone", which indicates the anode may be made from a conductive agent alone. Furthermore, it is unclear how the anode can include an active material and a conductive agent alone. Specifically, if the anode is made from both an active material and a conductive agent, the anode is not made from a conductive agent alone.

Claims Analysis

Examiner suggests the parenthesis in claims 1 and 4 be deleted to clarify that the limitations contained in the parenthesis are part of the claimed invention. The limitations contained in the parenthesis are considered part of the claimed invention.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2 and 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamauchi et al., US 5,705,296 in view of Moriguchi et al., US 6,576,369.

Kamauchi teaches a lithium secondary battery comprising a positive electrode, a negative electrode and an electrolyte wherein the positive electrode is composed of a lithium-cobalt phosphate positive active material. The lithium-cobalt phosphate is preferably $LiCoPO_4$ (col. 4, lines 16-19) and the active material may comprise only $LiCoPO_4$ (col. 4, lines 32-34). The negative electrode may a carbon material doped with lithium ion (col. 6, lines 15-23). A carbon negative electrode prevents dendrite without lowering energy density of the secondary battery (col. 6, line 66-col. 7, line 2). The electrolyte comprises a electrolytic salt and a nonaqueous solvent (col. 7, lines 45-60). Transition metals besides cobalt such as Ni, Fe, Mn, Cr and V may be contained in the lithium-phosphate positive active material (col. 4, lines 42-44).

Regarding claim 4, the positive electrode may comprise at least the lithium-cobalt phosphate active material, an electrical conducting agent and a binder (col. 4, lines 61-65). The

mixture is blended and formed into a positive electrode having desirable shape and size by a known method such as compression molding (col. 5, lines 18-22). The carbon active material of the negative electrode is mixed with a binder and formed into a carbon negative electrode of a desirable shape and size by compression molding (col. 7, lines 40-44).

Regarding claim 5, the positive active material has an average particle size of 0.01-20 μm (col. 2, lines 47-66).

Kamauchi does not explicitly teach the carbon negative electrode is a sintered carbon material.

However, Moriguchi teaches a lithium secondary battery having an anode comprising a graphite (carbon) material. A conventional method is used to produce the negative electrode of Moriguchi. As employed in prior art lithium secondary batteries, a graphite powder is applied to a metal base serving as a current collector with the aid of a suitable binder and is shaped thereon. Alternatively, a sintered electrode may be produced from the graphite powder without use of a binder. Thus, the negative electrode may be comprised predominantly or solely of the graphite powder (col. 15, lines 31-39).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Moriguchi teaches it is conventional to produce a sintered graphite material anode without use of a binder. One of skill would have been motivated to use a the conventional sintered graphite anode of Moriguchi as the anode for the lithium battery of Kamauchi because the prior art teaches such anodes are well known for use in lithium batteries. Moriguchi teaches both carbon electrodes formed with a binder, taught by

Kamauchi, and sintered electrodes (without binder) are conventional methods for forming carbon negative electrodes for lithium batteries.

»

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kamauchi et al., US 5,705,296 in view of Moriguchi et al., US 6,576,369 and further in view of Goodenough et al., US 5,910,382.

Kamauchi teaches a lithium secondary battery comprising a positive electrode, a negative electrode and an electrolyte wherein the positive electrode is composed of a lithium-cobalt phosphate positive active material. The lithium-cobalt phosphate is preferably $LiCoPO_4$ (col. 4, lines 16-19) and the active material may comprise only $LiCoPO_4$ (col. 4, lines 32-34). The negative electrode may a carbon material doped with lithium ion (col. 6, lines 15-23). A carbon negative electrode prevents dendrite without lowering energy density of the secondary battery (col. 6, line 66-col. 7, line 2). The electrolyte comprises a electrolytic salt and a nonaqueous solvent (col. 7, lines 45-60). Transition metals besides cobalt such as Ni, Fe, Mn, Cr and V may be contained in the lithium-phosphate positive active material (col. 4, lines 42-44). The positive electrode may comprise at least the lithium-cobalt phosphate active material, an electrical conducting agent and a binder (col. 4, lines 61-65). The mixture is blended and formed into a positive electrode having desirable shape and size by a known method such as compression molding (col. 5, lines 18-22). The carbon active material of the negative electrode is mixed with a binder and formed into a carbon negative electrode of a desirable shape and size by compression molding (col. 7, lines 40-44). The positive active material has an average particle size of 0.01-20 μm (col. 2, lines 47-66).

Kamauchi does not explicitly teach the carbon negative electrode comprises a sintered carbon material.

However, Moriguchi teaches a lithium secondary battery having an anode comprising a graphite (carbon) material. A conventional method is used to produce the negative electrode of Moriguchi. As employed in prior art lithium secondary batteries, a graphite powder is applied to a metal base serving as a current collector with the aid of a suitable binder and is shaped thereon. Alternatively, a sintered electrode may be produced from the graphite powder without use of a binder. Thus, the negative electrode may be comprised predominantly or solely of the graphite powder (col. 15, lines 31-39).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Moriguchi teaches it is conventional to produce a sintered graphite material anode without use of a binder. One of skill would have been motivated to use a the conventional sintered graphite anode of Moriguchi as the anode for the lithium battery of Kamauchi because the prior art teaches such anodes are well known for use in lithium batteries. Moriguchi teaches both carbon electrodes formed with a binder, taught by Kamauchi, and sintered electrodes (without binder) are conventional methods for forming carbon negative electrodes for lithium batteries.

Kamauchi does not explicitly teach the positive electrode active material is a lithium iron phosphate ($Li_xFe_yPO_4$).

However, Goodenough teaches cathode materials for secondary lithium batteries having the formula $LiMPO_4$ wherein M is at least one first row transition-metal cation. M is preferably

Mn, Fe, Co, Ti or Ni or a combination thereof. Preferred cathode materials include $LiFePO_4$ and $LiCoPO_4$ (col. 2, lines 12-34).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have been motivated to substitute the $LiFePO_4$ positive active material of Goodenough for the $LiCoPO_4$ positive active material of Kamauchi because Goodenough teaches both positive active materials are known for use in lithium secondary batteries. Furthermore, Kamauchi clearly suggests the $LiFePO_4$ positive active material compound. Kamauchi teaches transition metals besides cobalt such as Ni, Fe, Mn, Cr and V may be contained in the lithium-phosphate positive active material (col. 4, lines 42-44).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yamahira et al., 5,601,950 teaches a nonaqueous electrolyte secondary battery comprising a sintered carbonaceous material as an active anode material without employing a binder (col. 2, line 24-27).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is (703) 308-8821. The Examiner may normally be reached Monday-Thursday (9:00 AM-7:30 PM). My supervisor is Pat Ryan, who can be reached at (703) 308-2383. The Art Unit receptionist can be reached at

(703) 308-0661 and the official fax numbers are 703-872-9310 (after non-final) and 703-872-9311 (after final).

Tracy Dove
Patent Examiner
Technology Center 1700
Art Unit 1745

7/11/03